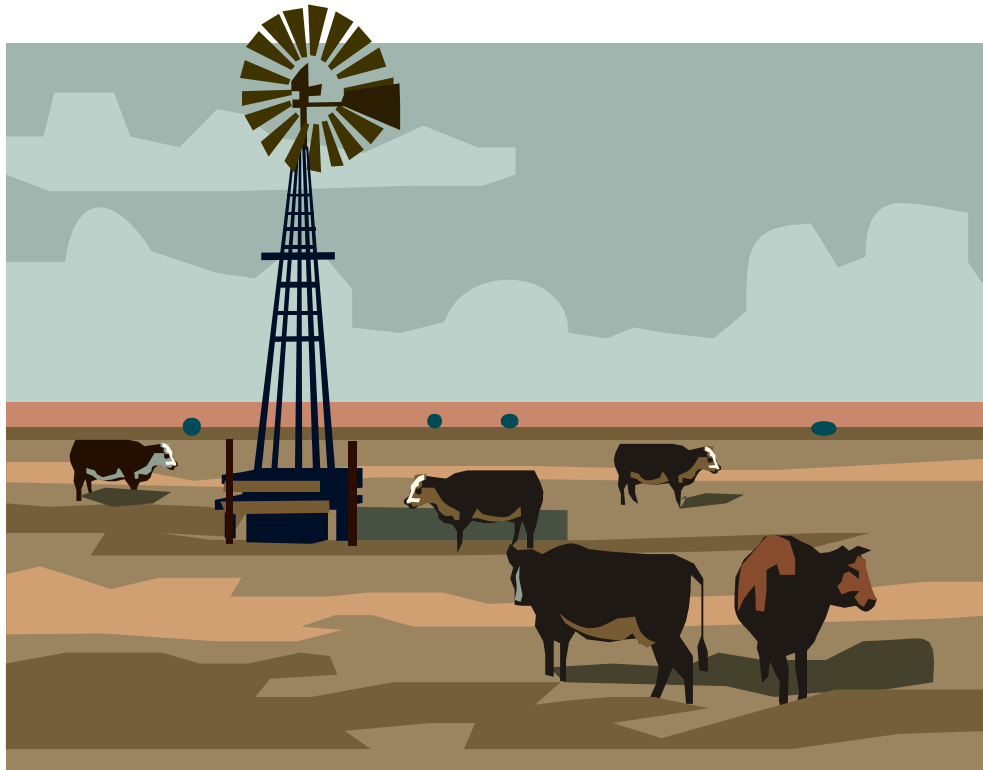


**Ranch Operators' Perceptions of Leafy Spurge Management
and Evaluation of the TEAM Leafy Spurge Project**

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Abstract

Leafy spurge is an exotic, noxious, perennial weed which is widely established in the north central United States and is an especially serious problem in the northern Great Plains (Bangsund et al. 1999). In 1997, the Agriculture Research Service and the Animal and Plant Health Inspection Service, U.S. Department of Agriculture, initiated a major Integrated Pest Management (IPM) research and demonstration project to develop and demonstrate ecologically based IPM strategies that can produce effective, affordable leafy spurge control.

In 1998 and 1999, a survey of ranchers and public land managers was conducted to evaluate managerial, institutional, and social factors that might affect the rate and extent of implementation of various control strategies. In 2001, a second survey of the same ranchers and public land managers was conducted to (1) assess any changes in land managers' perceptions of weed problems, control alternatives, and related issues, and (2) evaluate the impact of the TEAM Leafy Spurge project on the respondent's weed control practices.

The impacts of noxious weeds on grazing operations, specifically leafy spurge, are not abating, and ranchers seem more aware than ever of the severity of the problem. A slightly larger percentage of respondents in 2001 view leafy spurge as a major problem and the most serious problem for grazing operations than in 1998 and 1999. Heightened awareness among landowners may also be linked to TEAM Leafy Spurge's efforts to inform landowners of the problem and offer affordable, effective weed management techniques.

While the use of biological control methods, specifically flea beetles, has grown, herbicides continue to be the control practice of choice. While slightly fewer respondents reported using herbicides in 2001 than in 1998 and 1999, the vast majority of landowners plan to continue to use herbicides. Over 50 percent of respondents are using biological control and over 76 percent of respondents indicated flea beetles were either somewhat or very effective in controlling leafy spurge.

Nearly half of the respondents had heard of TEAM Leafy Spurge, and all TEAM Leafy Spurge demonstration sites, events, and publications were favorably rated. A large majority of the respondents agreed that the program had been effective in demonstrating and communicating leafy spurge treatment and control options. Based on the results of the 2001 survey, it would appear that the program has indeed made progress in communicating the type of information landowners need to address what continues to be a significant issue for grazing operations in the Midwest.

Key Words: leafy spurge, noxious weeds, weed management, rancher opinion

Ranch Operators' Perceptions of Leafy Spurge Management and Evaluation of the TEAM Leafy Spurge Project

Nancy M. Hodur, F. Larry Leistritz, and Dean A. Bangsund*

Leafy spurge is an exotic, noxious, perennial weed which is widely established in the north central United States and is an especially serious problem in the northern Great Plains (Bangsund et al. 1999). The unique physiological characteristics of leafy spurge make it difficult to control. While no single control method can eradicate established infestations, expansion can be controlled with a combination of biological and chemical control mechanisms in an integrated pest management (IPM) framework (Messersmith 1989; Lym and Messersmith 1994; Lym and Zollinger 1995; Lym et al. 1997). In 1997, the Agriculture Research Service and the Animal and Plant Health Inspection Service, U.S. Department of Agriculture, initiated a major IPM research and demonstration project, TEAM Leafy Spurge, to develop, integrate, and communicate ecological, economical, and sustainable leafy spurge management techniques to land managers. The primary goal of TEAM Leafy Spurge (TLS) was to develop and demonstrate ecologically based IPM strategies that can produce effective, affordable leafy spurge control. The TEAM Leafy Spurge project focused on a multi-county area in southwestern North Dakota, southeastern Montana, northeastern Wyoming, and northwestern South Dakota (Figure 1) with major demonstration sites located in Billings and Golden Valley Counties, North Dakota; Carter County, Montana; and Harding County, South Dakota.

One of the first phases of the project was to survey ranchers, local decision makers, and public land managers in the TEAM Leafy Spurge project area to evaluate managerial, institutional, and social factors that might affect the rate and extent of implementation of various control strategies (Sell et al. 1998a,b, 1999). In 2001, near the conclusion of the TEAM Leafy Spurge project, a second survey of the same group of ranchers and public land managers was conducted. The 2001 survey was undertaken to (1) assess any changes in land managers' perceptions of weed problems, control alternatives, and related issues, and (2) evaluate the impact of the TEAM Leafy Spurge project on the respondents' weed control practices.

Methods

A questionnaire was mailed to the same sample of ranchers and public land managers that Sell et al. (1998a, 1999) surveyed in 1998 and 1999. While the initial mailing list was obtained from Intertec Publishing (Intertec Publishing 1997, 1999), the 1997 list was supplemented with the names of 62 operators that had participated in sheep production workshops at the Hettinger Research Extension Center, Hettinger, ND. The sample consisted of producers in nine counties in North Dakota, South Dakota, Montana, and Wyoming that had some type of livestock grazing enterprise. Because leafy spurge is a management problem primarily on untilled land, only producers with livestock grazing enterprises were included in the

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sample. A total of 947 questionnaires were mailed and 329 questionnaires were returned, of which 270 were useable. Respondents that returned the questionnaire without completing any of the questions, often stated that the addressee was deceased, had retired, was no longer ranching, or for some other reason was unable to participate. Three mailings resulted in an overall response rate of 34.7 percent (unuseable questionnaires were included in the response rate). Response rates for the 1997 and 1998 surveys (Sell et al. 1998a,b, 1999) were slightly higher at 40.7 and 32.6 percent, respectively. Seasonal work load of the respondents likely may have contributed to the lower response rate. In the previous studies, the questionnaires were mailed in January, while the questionnaire for the 2001 survey was mailed in July. Results of the 1998 and 1999 surveys are combined in this report and reported as one result rather than two separate surveys.

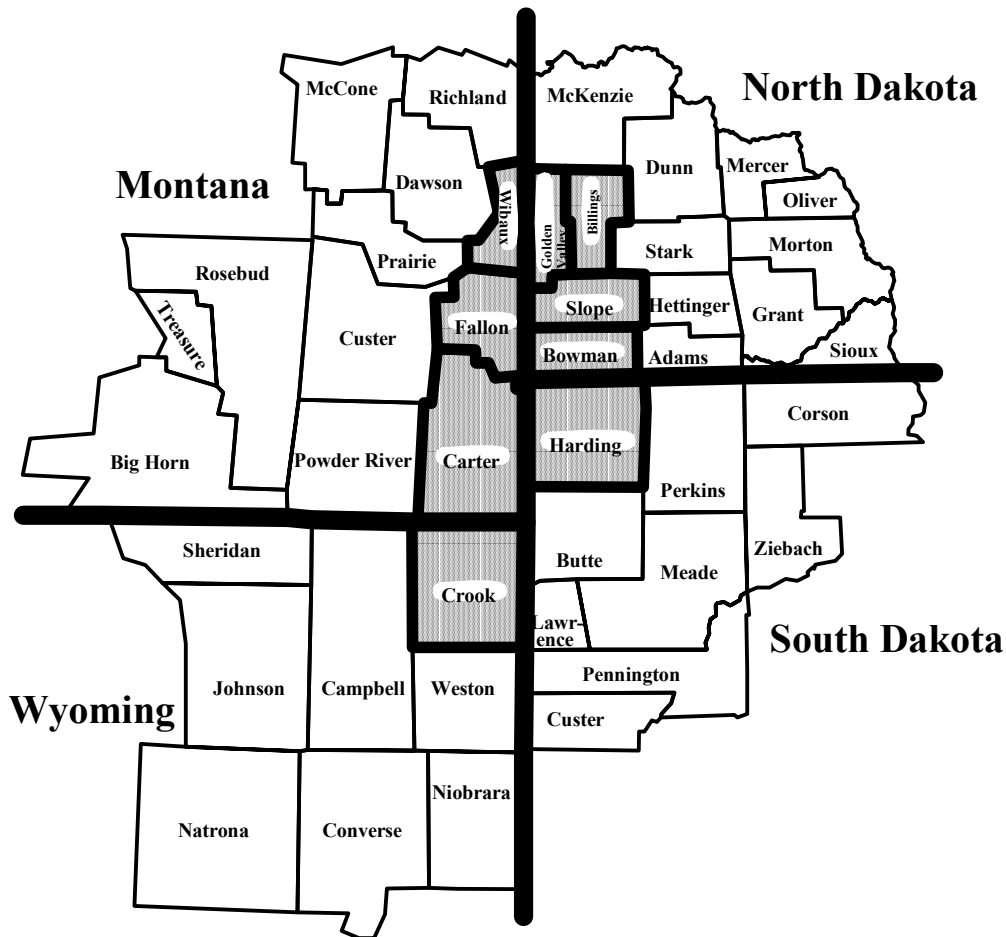


Figure 1. Study Counties, Ranch Operator Perceptions of Leafy Spurge Management, 2001

Results

Characteristics of Respondents

As seven of the nine study counties are located in North Dakota and Montana, a majority of the sample (72.2 percent), as well as a majority of the respondents, were from North Dakota (38 percent) and Montana (32 percent) (Table 1). Most respondents (87 percent) reported on average grazing 399 head of cattle and calves, while 22 percent of the respondents grazed an average of 656 sheep and lambs. Fifty-nine percent of respondents reported grazing horses; however, the average number of horses per respondent was only 8. Respondents owned on average 5,661 acres of which most was grazing land (4,055 acres) and rented an additional 3,818 acres, also most of which was grazing land (3,747 acres) (Table 2). A substantial portion of the rented acreage is public grazing land as 67 percent of respondents rented on average 2,414 acres of state and/or federal land (Table 2).

Table 1. Respondent Characteristics, Ranchers, 2001

State and County of Residence	Percent of Respondents	Percent of Sample
North Dakota	38.2	48.5
Golden Valley	7.5	
Billings	7.1	
Bowman	13.0	
Slope	10.6	
Montana	32.3	24.3
Carter	14.6	
Fallon	11.0	
Wibaux	5.9	
South Dakota	15.0	14.1
Harding	13.8	
Wyoming	14.6	13.1
Crook	13.8	
(n)	(254) ¹	(945) ²

¹ Number of respondents from all states.

² Sample size.

Table 2. Respondent Characteristics, Ranchers, 2001, 1998 and 1999

Average Acres	Owned	Rent or lease from others	Rent or lease to others
Hayland/Cropland (n)	1,163 (194)	766 (76)	212 (5)
Grazing land (n)	4,055 (208)	3,748 (152)	1,999 (12)
Total acres (n)	5,661 (209)	3,818 (145)	3,182 (15)
	Livestock per respondent, average	Number of animals grazed, all respondents	Percent of respondents with livestock
Livestock grazed in 2000			
Cattle and calves (n)	399 (234)	93,268 (234)	86.7 (270)
Sheep and lambs (n)	656 (60)	39,370 (234)	22.2 (270)
Horses (n)	8 (159)	1,258 (159)	58.9 (270)
Public (federal and/or state) grazing land	Acres	AUMS	
Average per respondent (n)	2,414 (135)	298 (69)	
Total all respondents (n)	325,999 (135)	20,582 (69)	
Other respondent characteristics	2001 survey	1998 and 1999 surveys ¹	
	-----percent-----		
Respondents that use public grazing land (n)	68.6 (248)	72.3 (n/a)	
Respondents that use computer (n)	62.4 (242)	46.2 (171)	
Respondents that have Internet access (n)	76.2 (181)	(n/a) (n/a)	

¹ Source: Sell et al. 1998a, 1999.

Respondents were also characterized by the use of computers for ranch management. Overall, about 62 percent of respondents reported using a computer in ranch management, and three fourths of the respondents have access to the Internet. This represents a substantial increase from the 46 percent who reported using a computer in 1998 and 1999 (Sell et al. 1998b) (Table 2).

Gross and net income of the respondents varied considerably. Just over 40 percent of respondents reported a gross farm/ranch income in 2000 of \$100,000 or less. Operators in this group would likely need substantial income from other sources to supplement their ranch income (Swenson 2001). Roughly 36 percent of the respondents reported gross income of \$100,000 to \$200,000, while the remaining 23 percent had gross incomes over \$200,000 (Table 3). Net ranch income varied also. More than 7 percent of respondents indicated that their net ranch income in 2000 was negative, and almost 35 percent had net ranch income of less than \$10,000. Approximately 34 percent had net ranch incomes between \$10,000 and \$30,000, while 24 percent had net ranch income over \$30,000 (Table 3).

Consistent with the 1998 and 1999 survey findings (Sell et al. 1998a, 1999), respondents earned most of their gross income from livestock grazing. On average, producers reported that 76 percent of their 2000 gross income came from livestock grazing, and 50 percent reported earning more than 90 percent of their gross income from livestock grazing. Only 17 percent of the respondents reported that less than 50 percent of their gross income came from livestock grazing (Table 3).

Problems Faced by Livestock Producers

The respondents were presented with a series of issues that affect livestock grazing operations and were asked to rate each issue as either a *major* problem, *not* a problem, or a *minor* problem. The same issues were presented to respondents in the 1998 and 1999 surveys. More than half the respondents identified 'adverse weather conditions' (55 percent), 'livestock prices' (54 percent), and 'the cost of feed and supplies' (53 percent) as major problems affecting grazing operations. Forty-six percent indicated 'regulations affecting use of public lands' was a major problem as well (Table 4). Compared to the responses in the 1998 and 1999 surveys, the 2001 survey respondents were less concerned about livestock prices and adverse weather conditions, but more concerned about regulations affecting the use of public lands. Eighty-five percent of the respondents identified 'livestock prices' as a major concern in the 1998 and 1999 surveys compared to 54 percent in the 2001 survey. Thirty-four percent cited 'regulations affecting use of public lands' as a major problem in the 1998 and 1999 surveys, compared to 46 percent in the 2001 survey. Some of the attitude change may be explained by higher cattle prices. Cattle prices were at record lows around the time of the 1998 and 1999 surveys. Similarly, regulations affecting grazing on public lands in the study area have received considerable attention over the past few years. At least one federal land management agency has proposed policy changes that could substantially reduce grazing on public lands, raising concerns among ranchers of the impacts of such a reduction (U.S. Department of Agriculture 2002).

Table 3. Respondent Characteristics, Ranchers, 2001, 1998 and 1999

Gross Farm/Ranch Income	2001 Survey	1998 and 1999 Surveys ¹
	-----percent-----	
\$50,000 or Less	14.4	n/a
\$50,000 to \$100,000	25.9	n/a
\$100,001 to \$150,000	22.0	n/a
\$150,001 to \$200,000	14.4	n/a
\$200,001 to 300,000	17.0	n/a
Over 300,000	6.4	n/a

Net Farm/Ranch Income	2001 Survey	1998 and 1999 Surveys ¹
	-----percent-----	
Negative	7.4	16.4
0 to \$5,000	19.2	15.2
\$5,001 to \$10,000	16.2	14.6
\$10,000 to \$20,000	16.2	18.7
\$20,001 to \$30,000	17.5	17.0
\$30,001 to \$40,000	7.9	7.0
\$40,001 to \$50,000	7.9	3.5
Over \$50,000	7.9	7.6

Gross Farm Income From Livestock Grazing	2001 Survey	1998 and 1999 Surveys ¹
	-----percent-----	
Less than 50 percent	16.5	18.0
50 to 74 percent	16.0	13.5
75 to 89 percent	17.3	19.7
90 percent or more	50.2	48.9
Average	75.5	80.0

¹ Source: Sell et al. 1998a, 1999.

Table 4. Problems Faced by Livestock Grazing Operations, Ranchers, 2001, 1998 and 1999

Problem/Issue	Major Problem		Most Serious Problem		Problem Became Worse	
	2001	1998 and 1999 ¹	2001	1998 and 1999 ¹	2001	1998 and 1999 ¹
Adverse weather conditions	54.7	61.4	25.2	23.7	12.2	20.8
Livestock prices	54.4	85.9	21.7	40.9	19.1	78.8
Cost of feed and supplies	52.6	54.3	12.6	8.1	57.0	59.6
Regulations affecting use of public lands	45.8	34.3	16.5	7.8	58.4	54.1
Noxious or invasive weeds	36.0	23.8	10.4	6.2	45.8	35.8
Ranchers with leafy spurge	50.3	n/a	16.5	n/a	50.3	n/a
Ranchers without leafy spurge	18.3	n/a	3.8	n/a	39.3	n/a
Predators	26.3	26.1	3.0	4.2	34.7	36.8
Availability of grazing land	23.8	27.5	8.3	6.5	29.1	31.3
Use of CRP for haying or grazing (n=263) ²	13.0	14.1	1.3	0.7	11.9	14.2

¹Source: Sell et al. 1998a, 1999.

²Average number of respondents per issue.

It appears that either there is a greater awareness of the noxious weed problem or noxious weeds are perceived as being more problematic. Noxious or invasive weeds were rated a major problem by 24 percent of the respondents in the 1998 and 1999 surveys while 36 percent of the respondents indicated noxious weeds were a major problem in the 2001 survey. Further, ranchers with leafy spurge were more likely to identify noxious or invasive weeds as a major problem. Fifty percent of the ranchers who reported leafy spurge on their ranch indicated noxious or invasive weeds were a major problem for livestock grazing operations. Of those respondents that did not report leafy spurge on their ranch, only 18 percent indicated that noxious weeds were a major problem affecting livestock grazing operations (Table 4).

When the respondents were asked which issue posed the single most serious problem for livestock grazing operations, adverse weather conditions (25 percent) and livestock prices (22 percent) were again the most frequent responses (Table 4), followed by regulations affecting the use of public lands (17 percent) and the cost of feed and supplies (13 percent). While the issues that pose problems to grazing operations remain relatively unchanged, the perceived severity appears to have changed somewhat. Livestock prices seemed to be more of a problem to respondents in the 1998 and 1999 surveys; 41 percent of the respondents rated livestock prices the most serious problem in the 1998 and 1999 surveys, compared to 22 percent of respondents in 2001. Alternately, regulations affecting public lands were perceived to be the most serious problem affecting livestock operations by more respondents in 2001 than in 1998 and 1999—17 percent of respondents in 2001 compared to 8 percent in 1998 and 1999. Noxious or invasive

weeds again ranked fifth among the nine issue areas in the 2001 survey—10 percent of respondents identified weeds as the most serious problem facing area livestock grazing operations; however, the perception that noxious weeds are a serious problem was much higher for respondents with leafy spurge infestations on their land. Of those respondents that indicated that noxious weeds were the most serious problem affecting livestock operations, 83 percent had leafy spurge on their grazing land (Table 4).

Regulations affecting the use of public lands and the cost of feed and supplies were most often identified as issues affecting grazing operations that had become worse over the last five years (Table 4); 58 and 57 percent, respectively. Responses were similar to the 1998 and 1999 surveys suggesting no major changes in ranch operators' perceptions. However, more respondents indicated that noxious or invasive weeds had become worse in the last five years in the 2001 survey than the 1998 and 1999 surveys; 46 percent in 2001 compared to 36 percent in 1998 and 1999. Further, half of the respondents with leafy spurge reported that the noxious/invasive weed problem had become worse in recent years compared to 39 percent of respondents without leafy spurge (Table 4). Alternately, livestock prices and weather conditions have apparently improved. In 1998 and 1999, 79 percent of respondents indicated that livestock prices had become worse in the last five years compared to only 19 percent of the respondents in 2001 (Table 4).

Species and Management Approaches

In addition to commenting on general issues affecting livestock operations, respondents were asked to rate the effect of several weed species on livestock grazing operations in their area. When asked which weed species posed problems for area livestock operations, over half of the respondents indicated that not only was leafy spurge a major problem, but also the most serious weed problem (Table 5). Of the respondents with leafy spurge on their land, 70 percent considered leafy spurge to be the most serious weed problem while only 30 percent of respondents without leafy spurge on their land indicated that leafy spurge was the most serious weed problem. Further, more ranchers considered leafy spurge a major problem in 2001 than in 1998 and 1999, 51 percent compared to 42 percent. Other weeds mentioned as major problems were thistles (34 percent), field bindweed (26 percent), and sagebrush (14 percent). Thistles were identified by 20 percent of the respondents as the most serious weed problem (Table 5).

When asked about weed problems on their own farm or ranch, more respondents indicated weeds were a major or minor problem in 2001 than in 1998 and 1999. Fifteen percent indicated that weeds were a major problem while another 71 percent rated them a minor problem, compared to 11 percent and 67 percent, respectively, in the earlier surveys (Table 6). More respondents reported leafy spurge on their ranch as well. Almost 56 percent of respondents reported leafy spurge infestations on their ranch in the current study, compared to 50 percent in 1998 and 1999 studies. Average infestations per respondent reporting leafy spurge on their farm or ranch was 124 acres compared to an estimated 185 acres in the 1998 and 1999 surveys (Table 6). (The 1998 and 1999 surveys reported average infestation as a percentage of grazing land, hayland, and other public land. The number of acres was estimated by applying the percent of acres infested to the average acreage operated per respondent.)

Table 5. Weeds Posing Problems for Livestock Grazing Operations, Ranchers, 2001, 1998 and 1999

Type of Weed	Major Problem				Most Important Problem			
	2001			1998 and 1999 ¹	2001			1998 and 1999 ¹
	overall ²	with leafy spurge ²	without leafy spurge ²	overall ²	overall	with leafy spurge	without leafy spurge	overall
	-----percent of respondents-----							
Leafy spurge	51.5	70.3	27.8	41.6	53.4	73.3	29.5	50.8
Thistles	34.2	40.1	27.6	21.4	20.2	6.9	36.8	13.1
Field bindweed	26.1	26.9	24.6	24.8	2.9	1.5	4.7	4.0
Sagebrush	13.5	11.9	14.8	9.9	8.4	5.3	11.3	11.5
Annual brome grasses	9.5	8.0	11.3	10.9	7.6	6.1	9.4	6.4
Prickly pear	8.3	9.4	7.1	5.6	1.7	1.5	1.9	2.4
Knapweed(s)	5.5	7.2	3.5	5.9	1.7	2.3	0.9	3.0
Wormwood (absinth)	1.2	0.7	1.8	0.5	0.4	0.7	0.0	0.3
Others ³	8.4	81.5	75.0	--	3.8	2.3	5.7	8.4
(n)	(262) ⁴	(137) ⁴	(115) ⁴	--	(262)	(131)	(106)	--

¹Source: Sell et al. 1998a, 1999.

²Detail does not add to total because of multiple responses.

³Other weeds identified as those that pose problems for livestock grazing operations were Canadian thistle, Burdock, Foxtail, Houndstongue, Cocklebur, Tansey, Buckbrush, and Fringed sagewort.

⁴Average number of responses for each weed type.

Table 6. Weed Problems on Respondent's Ranch or Farm, 2001, 1998 and 1999

Perception of Weed Problem	2001	1998-1999 ³
	-----percent-----	
Not a problem	13.8	22.0
Minor problem	71.1	67.0
Major problem	15.0	11.0
(n)	(246)	--
Currently have leafy spurge infestation	55.7	49.6
(n)	(262)	--
Average number of acres of leafy spurge on farm/ranch	124 ¹	185 ²
(n)	(124)	(342)

¹Only those respondents that currently have leafy spurge and reported the size of the infestation are included in the calculation.

²Number of acres was estimated by applying the percentage of average acres infested to the average number of acres per respondent.

³Source: Sell et al. 1998a, 1999.

Respondents who reported leafy spurge on their ranch were then asked about their current and anticipated use of various weed control practices (Table 7). Herbicides were still the most widely used control practice with 93 percent of the respondents currently using herbicides to control leafy spurge, and all respondents currently using herbicides planned to continue using herbicides. Biological control was the next most widely used control practice (53 percent), followed by IPM (51 percent), tillage and reseeding with competing grasses (27 percent), and sheep and goat grazing (18 percent). Compared to 1998 and 1999 studies, slightly more ranchers are using biological control practices and fewer are grazing sheep or goats. Respondents overwhelmingly indicated they plan to continue to use those practices currently in use, but are not very likely to implement new control practices. For example, 53 percent of the respondents reported using flea beetles to control leafy spurge, and 96 percent of those respondents plan to continue to use biological control. However, only 30 percent of those respondents not currently using biological control plan to do so in the future. The same pattern held true for the other control practices as well.

Table 7. Use of Selected Practices to Control Leafy Spurge, Ranchers, 2001, 1998 and 1999

Control Practice	Currently using Control Practice		Expect to Continue to use Control Practice	Plan to adopt Control Practice in the Future ²	Indicated Control Practice is Very Effective		Indicated "it pays" to use Control Practice	
	2001	1998 and 1999 ¹	2001	2001	2001	1998 and 1999 ¹	2001	1998 and 1999 ¹
	-----percent of respondents-----							
Herbicides (n)	93.0 (143)	97.4	100 (132)	40.0 (10)	25.7 (257)	26.8	54.7 (256)	70.4
Biological control (flea beetles) (n)	52.9 (138)	47.2	95.8 (71)	29.9 (57)	28.1 (256)	20.2	55.3 (253)	62.8
Sheep or goat grazing (n)	17.8 (137)	25.7	79.2 (24)	4.2 (95)	19.4 (252)	25.8	36.3 (256)	55.8
Tillage and reseeded (n)	27.0 (134)	13.3	88.8 (35)	2.2 (91)	2.0 (247)	5.7	13.0 (253)	23.2
Integrated Pest Management (IPM) (n)	50.8 (134)	n/a	97.0 (67)	29.0 (62)	33.9 (248)	n/a	46.6 (251)	n/a

¹Source: Sell et al. 1998a, 1999.

²Respondents not currently using control practice.

Respondents were also asked to evaluate the effectiveness of five leafy spurge control practices and whether they believe “it pays” to use the control practice. (The term “it pays” was used because the definition of “economical” can vary depending on how returns are estimated.) All control practices were generally viewed as either ‘somewhat effective’ or ‘very effective’ by most respondents (Appendix Table A1). Herbicides were viewed as effective by more respondents than the other control practices. Herbicides were rated as somewhat effective by 64 percent and very effective by 26 percent of the respondents; however, only 55 percent believe spraying with herbicides pays (Table 7 and Appendix Table A1). Seventy percent of the respondents in the 1998 and 1999 surveys indicated using herbicides ‘pays.’ The IPM approach, biological control with insects, and grazing with sheep and goats were all generally viewed as effective. More respondents perceived that biological control with insects was very effective in the 2001 survey than in the 1998 and 1999 surveys, 28 percent versus 20 percent; however, fewer respondents indicated ‘it pays’ to use biological control in the 2001 survey. Over half of the respondents in the 2001 survey indicated they believe biological control ‘pays’ (55 percent); down from the 63 percent of respondents that believed biological control ‘pays’ in the 1998 and 1999 surveys. The same trend was evident for the other control practices. For all control practices (except IPM for which there was no comparative data) fewer respondents in the 2001 survey believe the control method ‘pays’ than did in the 1998 and 1999 surveys. Just under half (47 percent) believe it pays to use an IPM approach (Table 7).

Weed Control Information Desired

One of the key components of TEAM Leafy Spurge was the dissemination of pertinent weed control strategies and management techniques to land managers. The 1998 and 1999 surveys queried respondents as to the preferred type and source of weed control information. The 2001 survey also addressed these issues to gauge changes in information needs.

Ranchers were most interested in information about the effectiveness of various herbicide treatment programs and the economics of herbicide treatments (Table 8). Roughly one third of the respondents were interested in information on the techniques and economics of biological control. Similar percentages (one third) of respondents indicated an interest in information regarding techniques, effectiveness, and economics of IPM systems. Responses were similar to those in the 1998 and 1999 surveys with slightly fewer respondents indicating an interest in information on various herbicide treatments, therefore suggesting no major shift in information needs.

Table 8. Types of Weed Control Information Most Wanted by Ranchers, 2001 and 1998 and 1999 Surveys

Item	2001 Survey	1998 & 1999 Surveys ¹
	- percent respondents very interested-	
Type of Information:		
Effectiveness of various herbicide treatment programs	40.3	46.2
Economics of herbicide treatments	38.8	44.8
How to get started with biological control	31.0	32.3
Economics of biological control	32.1	35.2
Techniques and effectiveness of sheep and goat grazing	19.8	19.0
Economics of sheep and goat grazing	20.0	21.1
Techniques and effectiveness of cultivation and reseeding	13.8	15.0
Economics of cultivation and reseeding	16.0	15.7
Techniques and effectiveness of Integrated Pest Management	30.5	n/a
Economics of Integrated Pest Management	31.6	n/a
(n)	(243) ²	--
Form of Information:		
Area demonstration plots showing various control methods	42.6	37.9
Testimonials from fellow ranchers or other land managers	35.7	38.6
Pamphlet or bulletin available through Extension office	35.5	45.6
Video cassettes demonstrating various control methods	28.4	33.5
Personal visits and on-site help from range mgt. specialists	25.4	33.0
Website/Internet	17.2	n/a
Computer decision aids (programs)	15.7	12.3
E-mail newsletters or notifications	11.9	n/a
(n)	(243) ²	--

¹Source: Sell et al. 1998a, 1999.

²Average number of respondents for each option.

The respondents also were asked in what form they would prefer to receive weed control information (Table 8). Area demonstration plots were the most popular form of information delivery; almost 43 percent indicated they were very interested in demonstration plots that illustrate the effectiveness of the various control methods. Testimonials from fellow ranchers or other land managers and pamphlets or bulletins available through Extension offices were the next most popular forms of information (35.7 and 35.5 percent, respectively). Demonstration plots, testimonials, and written pamphlets were also the most preferred forms of information identified in the 1998 and 1999 surveys, although the relative positions have changed. Pamphlets and bulletins were the most popular form of information dissemination in the earlier surveys while area demonstration plots ranked third in the previous study (Table 8).

Ranchers who have leafy spurge on their ranches generally expressed a higher level of interest in most types of weed control information. For instance, 48 percent of ranchers with leafy spurge on their ranch were very interested in obtaining information about the effectiveness of various herbicide treatment programs, compared to 31 percent of respondents without leafy spurge. This general pattern prevailed for all types of weed control information, except the techniques and economics of sheep and goat grazing and the economics of cultivation and reseeding, where fewer respondents with leafy spurge were interested in information on those subjects than respondents without leafy spurge (Appendix Table A2).

Evaluation of TEAM Leafy Spurge

Landowners were asked a series of questions designed to gauge the awareness and effectiveness of TEAM Leafy Spurge outreach efforts, a major component of the TEAM Leafy Spurge program. Almost half of the respondents (46 percent) indicated that they were aware of the TEAM Leafy Spurge project. Of those, about 24 percent first learned of the project through a newspaper story, while 23 percent heard of TEAM Leafy Spurge through their County Extension agent and 15 percent through the County Weed Board. Eighty percent of the respondents indicated they first became aware of TEAM Leafy Spurge in the project's first three years (1997-1999) (Table 9).

While only a small percentage of respondents attended the Spurgefest conferences (7 percent in 1999 and 2.7 percent in 2001), more than 16 percent attended a TEAM Leafy Spurge presentation at another event or meeting (e.g., County Weed Board Meeting) and 21 percent attended at least one TEAM Leafy Spurge sponsored event or presentation. (Table 9). These events were all rated quite positively by those who attended, with average scores ranging from 5.6 to 6.2 on a scale from 1 (poor) to 7 (excellent). The North Dakota biological control demonstration sites were visited by more respondents, 13 percent overall, perhaps because they were included in the tours associated with the 1999 and 2001 Spurgefest events (Table 9). The Montana biological control and herbicide treatment sites were visited by 8.7 and 8.3 percent of respondents, respectively, while the North Dakota herbicide and sheep grazing sites were visited by 7.9 and 7.5 percent, respectively, and 23.4 percent of all respondents visited at least one demonstration site. As was the case with TEAM Leafy Spurge events, the demonstration sites received positive ratings with average scores ranging from 4.6 to 6.2 (scale of 1 to 7 where 1 is poor and 7 is excellent).

TEAM Leafy Spurge bulletins reached almost one-fourth of the respondents (24 percent) and were rated favorably (average score 5.6) (Table 10). Far fewer respondents, however, had visited the TEAM Leafy Spurge website (3.2 percent) or were aware of the *PurgeSpurge* CD (3.8 percent). While less than 16 percent of respondents reported attending any TEAM Leafy Spurge event or biocontrol demonstration site, just over 20 percent of respondents reported collecting or receiving insects at a TEAM Leafy Spurge event. Some respondents may have attended a TEAM Leafy Spurge event, without attributing the event or meeting to TEAM Leafy Spurge. A majority of those respondents (60 percent) that collected or received insects felt that the insects had demonstrated an effect on leafy spurge infestations. Further, both the level of insect establishment and the degree of control were rated favorably with average scores of 4.9 and 4.4, respectively (Table 10).

Table 9. Rancher Awareness of TEAM Leafy Spurge Project, 2001

Item	Percent	
Respondent is aware of TEAM Leafy Spurge (TLS) Project	45.7	
(n)	(256)	
How Respondent heard of TLS Project:		
Newspaper	23.7	
County agent	22.9	
County Weed Board	15.3	
State or federal land manager	14.4	
University press release	5.9	
Another rancher/neighbor	5.1	
Other ¹	10.2	
(n)	(118)	
When Respondent first heard of TLS Project:		
1997	31.5	
1998	14.8	
1999	32.4	
2000	17.6	
2001	3.7	
(n)	(108)	
Attendance and Rating of TLS Events	Percent of respondents	Average score²
1999 Spurgefest	6.7	5.6
2001 Spurgefest	2.6	6.2
TEAM Leafy Spurge presentation at another event or meeting	16.3	5.9
(n = 240) ³		
Any Spurgefest or TLS event	21.2	
Visited TLS Demonstration Sites		
<i>North Dakota sites (Sentinel Butte/Medora)</i>		
Biological control	12.9	6.2
Sheep grazing	7.5	4.9
Herbicide treatment	7.9	4.6
(n=244) ³		
<i>Montana site (Ekalaka)</i>		
Biological control	8.7	5.4
Herbicide treatment	8.3	5.3
(n=252) ³		
<i>South Dakota site (Buffalo)</i>		
Biological control	3.6	5.5
Sheep grazing	2.8	6.2
Herbicide treatment	3.6	5.5
(n=249) ³		
Visited at least one demonstration site	23.3	n/a
(n=252) ³		
Visited at least one demonstration site or attended at least one TLS event or meeting	29.4	n/a
(n=252) ³		

¹ Trip to MSU-1997, Medora Grazing Association, radio/TV, Range tour, another individual.

² Based on a scale of 1 to 7, where 1 is poor and 7 is excellent.

³ Average number of responses per each demonstration site or event.

Table 10. Rancher Awareness of TEAM Leafy Spurge Project, 2001

Item	Percent	Average score ¹
Respondent has received TLS brochures or bulletins (n)	23.8 (256)	5.6 (59)
Respondent has visited TLS Website (n)	3.2 (244)	5.8 (8)
Respondent has heard of the Purge Spurge CD (n)	3.8 (263)	---
Respondent has used the Purge Spurge CD ² (n)	77.8 (9)	4.8 (7)
Respondent has collected or received insects (n)	20.2 (262)	---
Respondents that indicated the insects have affected leafy spurge infestations (n)	60.2 (93)	---
Degree to which insects have established (n)		4.9 (53)
Level of leafy spurge control to date from biocontrol (n)		4.4 (52)
Year received insects	Number of respondents	
1999	39	
2000	28	
2001	23	

¹Based on a scale of 1 to 7, where 1 is poor and 7 is excellent.

²Only those respondents that indicated they were aware of the Purge Spurge CD.

While overall participation rates may seem low, ranchers with leafy spurge on their land had a substantially higher level of interaction with the TEAM Leafy Spurge project than their counterparts without leafy spurge. Of the ranchers reporting leafy spurge, 59 percent were aware of the TEAM Leafy Spurge project compared to 29 percent of those without leafy spurge (Table 11). Similarly, 12 percent of ranchers with leafy spurge had attended Spurgefest 1999 and 5 percent had attended Spurgefest 2001, while none of the respondents without leafy spurge had attended either event. Other dimensions of interaction with the project (e.g., visits to demonstration sites) also were much higher for ranchers with leafy spurge (Table 11).

Table 11. Ranchers' Perceptions of Problems and Participation in TEAM Leafy Spurge Events, by Presence of Leafy Spurge on Ranch, 2001

Item	Ranchers		Overall
	Have Leafy Spurge	Do not have Leafy Spurge	
----- percent of respondents-----			
Interaction with TEAM Leafy Spurge:			
Aware of TEAM Leafy Spurge (TLS) Project	58.9	28.6	45.4
(n)	(141)	(112)	(253)
Attended 1999 Spurgefest	12.0	0.0	6.3
(n)	(125)	(112)	(237)
Attended 2001 Spurgefest	5.0	0.0	2.6
(n)	(120)	(112)	(232)
Attended TEAM Leafy Spurge presentation at another event or meeting	26.2	4.4	16.1
(n)	(130)	(113)	(243)
Visited TEAM Leafy Spurge Demonstration Sites:			
North Dakota sites (Sentinel Butte/Medora)			
Biological control	20.9	2.7	12.6
Sheep grazing	12.7	1.8	7.6
Herbicide treatment	12.6	1.8	7.5
(n)	(129)	(112)	(241)
Montana site (Ekalaka)			
Biological control	11.0	6.2	8.8
Herbicide treatment	11.0	5.3	8.4
(n)	(136)	(112)	(248)
South Dakota site (Buffalo)			
Biological control	5.2	1.8	3.6
Sheep grazing	3.0	2.7	2.9
Herbicide treatment	4.4	2.7	3.7
(n)	(135)	(111)	(739)
Visited at least one demonstration site	36.3	6.9	23.3
(n)	(146)	(116)	(262)
Visited at least one demonstration site or attended at least one TLS event or meeting	44.5	8.6	29.4
(n)	(146)	(116)	(262)
Received TLS brochures or bulletins	32.1	12.4	23.3
(n)	(140)	(113)	(253)
Visited TLS Website	5.8	0.0	3.2
(n)	(139)	(110)	(249)
Collected or received insects	34.3	1.8	20.0
(n)	(146)	(114)	(260)

Respondents were asked to rate several general statements about the effectiveness of TEAM Leafy Spurge. Responses were generally favorable; however, roughly one third of the respondents offered an opinion on statements describing TEAM Leafy Spurge even though earlier in the questionnaire they indicated they were not aware of TEAM Leafy Spurge. Accordingly, respondents that were *unaware* of TEAM Leafy Spurge were excluded from the calculations. When those respondents that indicated they were not aware of TEAM Leafy Spurge were removed from the calculation, the percentage of respondents that either agreed or strongly agreed that TEAM Leafy Spurge was effective in communicating leafy spurge treatment and control options went from 69 percent to 81 percent. Average scores also increased when respondents that were unaware of TEAM Leafy Spurge were excluded from the calculation. The pattern was the same when respondents rated TEAM Leafy Spurge's performance in demonstrating the effectiveness of herbicides, biological control agents, and grazing in controlling leafy spurge. Both the percentage of respondents that agreed with the statements and the average score increased (Table 12). Further, over half indicated they personally benefitted from the project and a strong majority (83 percent) indicated they believe funding for the project should be extended to continue research and education programs (Table 12). Very few respondents disagreed with statements describing TEAM Leafy Spurge effectiveness.

Respondents were also asked if TEAM Leafy Spurge had influenced their weed management program. Again, only those respondents that indicated they were aware of the program (roughly half of all respondents) were included in the calculations. A majority of the respondents (68 percent) indicated that TEAM Leafy Spurge had satisfactorily demonstrated the effectiveness of using herbicides to control leafy spurge as well as satisfactorily provided information on how to use herbicides to control leafy spurge (66 percent). Just over 50 percent of the respondents indicated that TEAM Leafy Spurge had influenced their plans for future herbicide use. Of those that indicated that TEAM Leafy Spurge had influenced their plans, 60 percent said they plan to use herbicides to stop leafy spurge infestations from spreading, and 55 percent indicated they plan to integrate herbicides with other control methods. Of those that indicated TEAM Leafy Spurge had not influenced their plans, 74 percent indicated that they were already using herbicides (Table 13). When the reasons why TEAM Leafy Spurge had not influenced respondents plans are compared to the reasons why respondents were not using herbicides in the 1998 and 1999 surveys, respondents were generally less negative about constraints to using herbicides. For example in the 1998 and 1999 surveys, 60 percent of respondents indicated 'environmental restrictions prevent herbicide use' compared to only 29 percent in the 2001 survey. Further, 46 percent of respondents in the 1998 and 1999 surveys indicated 'infestations are too large, herbicides would be prohibitively expensive,' compared to only 23 percent in the 2001 survey. Only 10 percent indicated 'lack equipment, expertise, or access to certified applicators' as a constraint to herbicide use compared to 24 percent in the 1998 and 1999 surveys (Table 13).

Table 12. Ranchers' Attitudes Toward TEAM Leafy Spurge Project, 2001

Item	Average Score, all respondents ¹	Average Score, aware of TLS ^{1,2}	Percent agree, all respondents	Percent agree, aware of TLS ²
The project has been effective in demonstrating and communicating leafy spurge treatment and control options to ranchers (n)	3.9 (134)	4.2 (85)	69.2 (130)	81.1 (85)
The project has clearly demonstrated the effectiveness of herbicides in controlling leafy spurge (n)	3.6 (132)	3.8 (85)	54.7 (128)	67.9 (85)
The project has clearly demonstrated the effectiveness of biological control agents such as flea beetles in controlling leafy spurge (n)	3.9 (136)	4.2 (87)	63.6 (132)	78.1 (87)
The project has clearly demonstrated the effectiveness of sheep grazing in controlling leafy spurge (n)	3.4 (129)	3.5 (81)	43.2 (125)	47.0 (81)
I have personally benefitted from the project (n)	3.4 (128)	3.7 (83)	42.1 (126)	56.6 (83)
Project funding should be extended to continue research and education programs (n)	4.1 (134)	4.1 (86)	69.2 (130)	82.5 (86)

¹ Based on a scale of 1 to 5 where 1 is strongly disagree and 5 is strongly agree.

² Only respondents that indicated they were aware of TLS were included in the calculation.

Table 13. Impact of TEAM Leafy Spurge Project on Weed Control Strategies using Herbicides, Ranchers, 2001, 1998 and 1999

Item	2001 ¹	1998 and 1999 ²
TEAM Leafy Spurge has satisfactorily demonstrated the effectiveness of using herbicides to control leafy spurge (n = 83)	68.3	n/a
TEAM Leafy Spurge has satisfactorily provided information on how to properly use herbicides to control leafy spurge (n=80)	66.3	n/a
TEAM Leafy Spurge has influenced plans to use herbicide on leafy spurge in the future (n=80)	52.5	n/a
If Yes:		
Plan to use herbicides to stop infestations from spreading	60.0	n/a
Plan to integrate herbicides with other control methods	55.0	n/a
Plan to spray more of my leafy spurge	12.5	n/a
Plan to switch herbicides	15.0	n/a
Plan to change herbicide application rates	10.0	n/a
Plan to use herbicides on different infestations	10.0	n/a
Plan to reduce herbicide use and switch to other controls (n=40) ³	10.0	n/a
If No:		
Currently using herbicides	74.2	n/a
Infestations are too large, herbicides would be prohibitively expensive	22.6	46.3
Infestations are inaccessible to sprayers	32.3	45.9
Currently using other control methods	38.7	n/a
Do not have time to spray	25.8	26.9
Environmental restrictions prevent herbicide use	29.0	58.9
Not economical to use herbicide	25.8	43.5
Not convinced herbicides are effective	19.4	25.3
Cost share programs are no longer available	19.3	30.4
Cannot afford to purchase herbicide	9.7	n/a
Lack equipment, expertise, or access to certified applicators	9.7	24.1
Potential damage to non-target species (n=31) ³	12.9	n/a

¹ Only respondents that indicated they were aware of TEAM Leafy Spurge (Question 13) are included in the distribution of responses.

² Source: Sell et al. 1998a, 1999.

³ Average number of respondents for each variable.

Respondents (81 percent) also indicated that TEAM Leafy Spurge had satisfactorily demonstrated the effectiveness of biological agents to control leafy spurge and had satisfactorily provided information on how to properly use biological agents to control leafy spurge (78 percent). Nearly 60 percent indicated that TEAM Leafy Spurge had influenced their plans to use biological agents in the future. Of those that indicated that TEAM Leafy Spurge had influenced their plans to use biological control agents, 75 percent indicated they are currently planning to use biological agents to control leafy spurge as a result of TEAM Leafy Spurge, and 50 percent indicated that because insects (biological control agents) were now free and readily available, they were trying biological control methods. Of those that indicated TEAM Leafy Spurge had not influenced their plans to use biocontrol to control leafy spurge, over half indicated their leafy spurge infestation was too small to use biocontrol agents, and approximately one third of the respondents indicated they were still not convinced biological control agents work or that they were currently using other control methods (Table 14). Other constraints to using biological control appeared to be lessening. For example, 43 percent of respondents indicated in the 1998 and 1999 surveys they were not using insects for leafy spurge control because they had ‘limited access to insects, cannot collect sufficient numbers of insects.’ Only 7 percent responded accordingly in the 2001 survey. Also in the 1998 and 1999 surveys, 31 percent of respondents said they ‘do not know where to collect insects’ and 29 percent said they ‘they do not know how to use biological control,’ compared to only 3 percent and 7 percent accordingly in the 2001 survey (Table 14).

Fewer respondents were inclined to incorporate sheep grazing into their leafy spurge control program. While 48 percent of respondents indicated that TEAM Leafy Spurge had satisfactorily demonstrated the effectiveness of grazing sheep to control leafy spurge and 39 percent indicated TEAM Leafy Spurge had satisfactorily provided information on how to properly implement a sheep grazing program to control leafy spurge, only 17 percent indicated that TEAM Leafy Spurge had influenced their plans to graze sheep. Of those who indicated that TEAM Leafy Spurge had not influenced their plans, 43 percent indicated there were too many constraints, such as fencing and equipment, and 36 percent indicated their infestations were too small for sheep grazing to be practical. In the 1998 and 1999 surveys, 72 percent indicated there were too many constraints. There was no comparative data regarding the size of leafy spurge infestations as a constraint to sheep and goat grazing. Other issues show some change in attitude regarding sheep grazing as well. In the 1998 and 1999 surveys, 40 percent of respondents said ‘sheep or goat grazing is too time consuming’ and 42 percent said ‘they do not know enough about sheep management’ compared to only 15 percent and 11 percent, respectively. Among those who indicated that TEAM Leafy Spurge had influenced their plans, 63 percent indicated they were already using sheep grazing to control leafy spurge (Table 15).

Table 14. Impact of TEAM Leafy Spurge Project on Weed Control Strategies using Biological Control with Insects, Ranchers, 2001¹ and Comparison with the 1998 and 1999 Surveys

Item	2001 ¹	1998 and 1999 ²
	-----percent-----	
TEAM Leafy Spurge has satisfactorily demonstrated the effectiveness of using biological agents (flea beetles) to control leafy spurge (n=82)	80.7	n/a
TEAM Leafy Spurge has satisfactorily provided me with information on how to properly use biological agents to control leafy spurge (n=82)	78.1	n/a
TEAM Leafy Spurge has influenced my plans to use biological agents to control leafy spurge in the future (n=77)	58.4	n/a
If Yes:		
Currently planning to use biological control as a result of TLS	75.0	n/a
Because insects are free and readily available,		
I am now trying biocontrol	50.0	n/a
Plan to change how I collect and release insects	15.0	n/a
Plan to modify where I use insects (n=40) ³	10.0	n/a
If No:		
Infestation is too small to use biological control (insects)	53.6	n/a
Still not convinced biological control will work	32.1	n/a
Currently using other control methods	32.1	n/a
Infestations not suitable for biological control	19.4	15.2
Biological control with insects works too slowly	17.8	42.4
Already using insects	16.1	n/a
Do not have time to collect/release insects	10.7	20.0
Do not know how to use biological control (insects)	7.1	29.5
Limited access to insects, cannot collect sufficient numbers	7.1	43.3
Insects have not been effective on my infestations in the past	7.1	n/a
Do not know where to collect insects	3.6	31.4
Biological control agents are not economical	3.6	10.5
Afraid biological control agents will harm other plants	3.6	14.8
Biological control agents will spread without my help (n=40) ³	0.0	4.8

¹ Only respondents that indicated they were aware of TEAM Leafy Spurge (Question 13) are included in the distribution of responses.

² Source: Sell et al. 1998a, 1999.

³ Average number of respondents for each variable.

Table 15. Impact of TEAM Leafy Spurge Project on Weed Control Strategies using Sheep Grazing, Ranchers, 2001 and 1998 and 1999 Surveys

Item	2001 ¹	1998 and 1999 ²
	-----percent-----	
TEAM Leafy Spurge has satisfactorily demonstrated the effectiveness of sheep grazing to control leafy spurge (n=73)	47.9	n/a
TEAM Leafy Spurge has satisfactorily provided me with information on how to properly implement a sheep grazing program to control leafy spurge (n=73)	39.1	n/a
TEAM Leafy Spurge has influenced my plans to graze sheep to control leafy spurge in the future (n=73)	17.1	n/a
If Yes:		
Am currently using sheep as a control method	63.6	n/a
While grazing works, do not have resources to implement a grazing program	36.7	n/a
I am planning to use sheep grazing as a result of TEAM Leafy Spurge (n=11) ³	18.2	n/a
If No:		
Too many constraints to sheep grazing (fencing, stock, equipment)	43.4	72.2
Infestation is too small	35.9	n/a
Do not have resources to manage sheep	22.6	n/a
Do not like sheep or goats	28.3	35.9
Do not want another enterprise on ranch	30.2	n/a
Still not convinced sheep grazing will work	22.6	19.3
Sheep or goat grazing is too time consuming	15.1	39.9
Pasture acreage is too small to graze sheep	9.4	n/a
Do not know enough about sheep management	11.3	41.7
Sheep will compete with cattle for forage	15.1	37.2
Sheep grazing will negatively affect non-target species	11.3	n/a
Sheep grazing was ineffective in the past	3.8	n/a
Sheep grazing is too costly, not economical (n=53) ³	5.7	21.1

¹ Only respondents that indicated they were aware of TEAM Leafy Spurge (Question 13) are included in the distribution of responses.

² Source: Sell et al. 1998a, 1999.

³ Average number of respondents for each variable.

The final issue addressed in the questionnaire explored the potential applicability of the TEAM Leafy Spurge program model to other problem rangeland weeds, and respondents were asked for suggestions for improvement if another project like TEAM Leafy Spurge were developed. Nearly all respondents indicated that the TEAM Leafy Spurge format would be applicable to Canada thistle, and 88 percent believed it would be applicable to the knapweeds (Table 16). No one suggestion for improving the TEAM Leafy Spurge approach stood out; however, the most frequent suggestion was to add a monthly bulletin, newsletter, or e-mail notification (45 percent). Other suggestions included more outreach activities (42 percent), more demonstration sites (40 percent), and more frequent field tours (35 percent).

Table 16. Applicability of TEAM Leafy Spurge Format to Other Problem Weeds and Suggested Changes, Ranchers, 2001

Item	Percent of Respondents
Weed:	
Canada thistle	93.8
Knapweed(s) (n = 146) ¹	88.2
Suggested Changes to TEAM Leafy Spurge format:	
Monthly bulletin, newsletter, or e-mail	44.9
More outreach activities (field days, workshops)	41.5
More demonstration sites	39.8
More frequent field tours	34.8
Better interaction with/accessibility to researchers	32.2
Other sources of insects in addition to self-collection	26.3
More opportunities to collect insects (n = 118) ¹	24.6

¹Detail does not add to total because of multiple responses.

Key Findings

The impacts of noxious weeds on grazing operations, specifically leafy spurge, are not abating and ranchers seem more aware than ever of the severity of the problem. A slightly larger percentage of respondents in 2001 view leafy spurge as a major problem and the most serious problem for grazing operations than in the 1998 and 1999 surveys. Leafy spurge continues to be viewed as the most serious weed issue by over 50 percent of the respondents. Heightened awareness among landowners may also be linked to TEAM Leafy Spurge's efforts to inform landowners of the problem and offer affordable, effective weed management techniques. In addition to noxious weeds, regulations affecting the use of public grazing land appear to be an issue of increasing importance. Alternately, weather conditions and livestock prices are issues that many ranchers still consider a major problem, but fewer ranchers rank them as major problems and fewer ranchers believe those problems have become worse than in the 1998 and 1999 surveys.

There were some slight shifts in respondents' source of income. Slightly more respondents in 2001 make less than 50 percent of their gross farm income from livestock grazing and slightly fewer make more than 90 of their gross farm income from livestock grazing. The average gross farm income from livestock grazing is down slightly from the 1998 and 1999 surveys from 80 percent to 75 percent in 2001.

Herbicides continue to be the control practice of choice. While slightly fewer respondents reported using herbicides in 2001 than in 1998 and 1999, the vast majority of landowners plan to continue to use herbicides even though landowners' confidence in herbicides was down slightly. Sixteen percent fewer respondents think it pays to use herbicides in the 2001 survey than in the 1998 and 1999 surveys.

The use of biological control methods, specifically flea beetles, has grown. More respondents in 2001 are currently using and plan to continue to use flea beetles for leafy spurge control than in 1998 and 1999. Fifty percent of the respondents expected to continue to use flea beetles in the earlier surveys, but nearly all of the respondents to the 2001 survey currently using flea beetles plan to continue to use flea beetles. Overall, over 50 percent of respondents are using biological control, and over 76 percent of respondents indicated flea beetles were either somewhat or very effective in controlling leafy spurge. Only 4 percent indicated that flea beetles were not effective.

TEAM Leafy Spurge appeared to successfully influence landowners' weed control plans with the exception of using sheep or goats. Over 50 percent of the 2001 respondents indicated TEAM Leafy Spurge influenced their weed control plans regarding herbicides and biological control agents, while only 17 percent indicated that TEAM Leafy Spurge influenced their decisions regarding sheep grazing. Of those respondents that were not influenced by TEAM Leafy Spurge, the lack of information or expertise were not so much a factor in their decision but rather other constraints outside the control of the rancher more often influenced their decision. In the case of herbicides, 74 percent of the respondents said TEAM Leafy Spurge had not

influenced their decision to use herbicides because they were already using herbicides, 32 percent indicated their infestation was inaccessible to sprayers, and 38 percent indicated they were using other control methods. The pattern was similar for biological control. TEAM Leafy Spurge influenced the decision of over 58 percent of respondents regarding biological control. Of those respondents that indicated TEAM Leafy Spurge had influenced their decision, 50 percent said they would now try biocontrol because insects are free and readily available and 75 percent are planning to use biological control in the future. Of those that indicated TEAM Leafy Spurge had not influenced their decision to use biocontrol, over half said their infestation was too small to use biological control agents, and one third were not convinced biological control would work.

In 2001, ranchers are generally interested in the same types of information as they did in 1998 and 1999, that is, the techniques, the effectiveness, and the economics of various leafy spurge control methods. Preferred methods of information delivery changed slightly in 2001 as more respondents became interested in demonstration plots than in 1998 and 1999 and fewer are interested in pamphlets or bulletins. Interest in electronic communication methods would appear to be on the rise as more and more ranchers are using computers for ranch management and have Internet access.

Nearly half of the respondents had heard of TEAM Leafy Spurge, and all TEAM Leafy Spurge demonstration sites, events, and publications were favorably rated. A large majority of the respondents agreed that the program had been effective in demonstrating and communicating leafy spurge treatment and control options. Further, a large majority of landowners indicated they believe the TEAM Leafy Spurge model would be applicable to other problem weeds, specifically, Canada thistle and Knapweeds.

Conclusions

While more options for leafy spurge control are currently available than even just a few years ago, leafy spurge continues to be a problem for ranchers throughout the survey area. The goal of TEAM Leafy Spurge was to develop and deliver economical, effective leafy spurge control techniques to land managers. Based on the results of the 2001 survey, it would appear that the program has indeed made progress in communicating the type of information landowners need to address what continues to be a significant issue for grazing operations in the Midwest.

References

- Bangsund, D. A., F. L. Leistritz, and J. A. Leitch. 1999. "Assessing economic impacts of biological control of weeds: The case of leafy spurge in the northern Great Plains of the United States." *Journal of Environmental Management* 56: 35-43.
- Intertec Publishing, Inc. 1997, 1999. Unpublished subscription lists. Intertec Publishing, Inc., Overland Park, KS.
- Lym, R. G., and C. G. Messersmith. 1994. "A decade of herbicide treatments controlled leafy spurge." *North Dakota Farm Research* 50:9-12.
- Lym, R. G., and R. K. Zollinger. 1995. *Integrated Management of Leafy Spurge*. Extension Publication W-866, North Dakota State University Extension Service, Fargo.
- Lym, R. G., K. K. Sedivic, and D. R. Kirby. 1997. "Leafy spurge control with angora goats and herbicides." *Journal of Range Management* 50:123-128.
- Messersmith, G.G. 1989. "Leafy spurge control: reflections on 17 years of research." Pages in R. M. Nowierski, ed., *Proceedings, 1989 Leafy Spurge Symposium*, Montana Agricultural Experiment Station, Montana State University, Bozeman.
- Sell, Randall S., Dean A. Bangsund, F. Larry Leistritz, and Dan Nudell. 1998a. *Ranch Operators' Perceptions of Leafy Spurge*. Agr. Econ. Rpt. No. 400, Department of Agricultural Economics, North Dakota State University, Fargo.
- Sell, Randall S., Dean A. Bangsund, F. Larry Leistritz, and Dan Nudell. 1998b. *Perceptions of Leafy Spurge by Public Land Managers, Local Decision Makers, and Ranch Operators*. Agr. Econ. Rpt. No. 406, Department of Agricultural Economics, North Dakota State University, Fargo.
- Sell, Randall S., Dean A. Bangsund, F. Larry Leistritz. 1999. *Perceptions of Leafy Spurge by Ranch Operators and Local Decision Makers: An Update*. Agr. Econ. Stat. Series Rpt. No. 56. Department of Agricultural Economics, North Dakota State University, Fargo.
- Swenson, Andrew L. 2001. *Financial Characteristics of North Dakota Farms, 1998-2000*. Agribusiness and Applied Economics Report No. 467, Department of Agribusiness and Applied Economics, North Dakota State University, Fargo.
- U.S. Department of Agriculture. 2002. *Northern Great Plains Revised Management Plans and Final Environment Impact Statement*. U.S. Forest Service, Washington, DC.

APPENDIX A - TABLES

Table A1. Evaluation of Effective and Economical Methods to Control Leafy Spurge, Ranchers, 2001

Practice	Not Effective	Somewhat Effective	Very Effective	Don't Know
Effectiveness of Practices:				
Spraying with herbicides	3.1	63.8	25.7	7.4
Biological control (insects)	4.3	48.4	28.1	19.1
Grazing animals (sheep or goats)	11.5	42.5	19.4	26.6
Tillage and/or reseeded with competing grasses	28.3	28.7	2.0	40.9
Integrated Pest Management (n = 257) ¹	2.0	32.7	33.9	31.4
Practice	Yes "It Pays"	Pays Marginally	Does Not Pay	Don't Know
Economical to Use These Practices:				
Spraying with herbicide	54.7	29.3	3.5	12.5
Biological control (insects)	55.3	22.2	2.0	20.6
Grazing animals (sheep or goats)	36.3	32.0	8.2	23.4
Tillage and/or reseeded with competing grasses	13.0	19.0	22.9	45.1
Integrated Pest Management (n = 257) ¹	46.6	18.3	2.0	33.1

¹Average number of respondents per control practice.

Table A2. Type of Weed Control Information, Ranchers, 2001

Type of Weed Control Information	Ranchers		Overall
	Have Leafy Spurge	Do not have Leafy Spurge	
	--- Percent of respondents <i>very interested</i> ---		
Effectiveness of various herbicide treatment programs (n)	48.2 (135)	31.1 (106)	40.7 (241)
Economics of herbicide treatments (n)	44.3 (131)	32.7 (104)	39.2 (235)
How to get started with biological control (n)	36.4 (132)	23.8 (105)	30.8 (237)
Economics of biological control (n)	39.0 (136)	22.6 (102)	31.9 (238)
Techniques and effectiveness of sheep and goat grazing (n)	15.3 (131)	26.0 (104)	20.0 (235)
Economics of sheep and goat grazing (n)	15.2 (132)	26.4 (106)	20.2 (238)
Techniques and effectiveness of cultivation and reseeding (n)	15.0 (133)	12.5 (104)	13.9 (237)
Economics of cultivation and reseeding (n)	14.6 (130)	17.9 (106)	16.1 (236)
Techniques and effectiveness of Integrated Pest Management (n)	34.3 (134)	26.2 (103)	30.8 (237)
Economics of Integrated Pest Management (n)	34.6 (130)	28.6 (105)	31.9 (235)

Table A3. Attitudes toward TEAM Leafy Spurge, Ranchers, 2001¹

Item	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree	Average Score ²
	-----percent of respondents-----					
The project has been effective in demonstrating and communicating leafy spurge treatment and control options to ranchers (n=85)	0	1.2	17.6	37.6	43.5	4.2
The project has clearly demonstrated the effectiveness of herbicides in controlling leafy spurge (n=88)	2.4	5.9	23.8	42.9	25	3.8
The project has clearly demonstrated the effectiveness of biological control agents such as flea beetles in controlling leafy spurge (n=87)	1.2	1.2	19.5	31	47.1	4.2
The project has clearly demonstrated the effectiveness of sheep grazing in controlling leafy spurge (n=87)	7.4	6.2	39.5	23.5	23.5	3.5
I have personally benefitted from the project (n=83)	7.2	3.6	32.5	25.3	31.3	3.7
Project funding should be extended to continue research and education programs (n=86)	1.7	2.3	14	17.4	65.1	4.1

¹Only those respondents that indicated they were aware of TEAM Leafy Spurge were included in the distribution of responses.

APPENDIX B --WEED MANAGEMENT SURVEY
(Farm and Ranch Operators)

The following questions pertain to grazing and weed management issues in **your local area**.

1. Please rate each of the following problems/issues that may affect livestock grazing operations in your area: (circle the appropriate number)

	Not a Problem	Minor Problem	Major Problem	Don't Know
a. adverse weather conditions	1	2	3	4
b. availability of grazing land	1	2	3	4
c. cost of feed and supplies	1	2	3	4
d. livestock prices	1	2	3	4
e. noxious or invasive weeds	1	2	3	4
f. predators	1	2	3	4
g. regulations affecting use of public lands	1	2	3	4
h. use of CRP for haying and grazing	1	2	3	4
i. others (please specify _____)	1	2	3	4

2. Which problem/issue listed in Question 1 do you feel is the **most serious** problem affecting grazing operations in your area? (**Circle** the appropriate letter)

3. Have these problems/issues in your area improved, remained the same or become worse over the past five years?

	Improved	Remained the Same	Become Worse	Don't Know
a. adverse weather conditions	1	2	3	4
b. availability of grazing land	1	2	3	4
c. cost of feed and supplies	1	2	3	4
d. livestock prices	1	2	3	4
e. noxious or invasive weeds	1	2	3	4
f. predators	1	2	3	4
g. regulations affecting use of public lands	1	2	3	4
h. use of CRP for haying and grazing	1	2	3	4
i. others (please specify _____)	1	2	3	4

4. Which weeds pose problems for livestock grazing operations in your area? (please rate each of following weeds)

	Not a Problem	Minor Problem	Major Problem	Don't Know
a. annual brome grasses	1	2	3	4
b. knapweeds	1	2	3	4
c. leafy spurge	1	2	3	4
d. prickly pear	1	2	3	4
e. sagebrush	1	2	3	4
f. thistles	1	2	3	4
g. wormwood (absinth)	1	2	3	4
h. field bindweed	1	2	3	4
i. others (please specify _____)	1	2	3	4

5. Which weed listed above currently poses the **most serious** problem for grazing operations in your area? (**Circle** the appropriate letter)

The following questions pertain only to **your farm or ranch operation**.

6. How serious is the weed problem on your farm or ranch? (please circle)

not a problem

minor problem

major problem

Please estimate how many **acres** of the following weeds are on your farm/ranch?

	Grazing Land	Hay Land
a. annual brome grasses	_____	_____
b. knapweeds	_____	_____
c. leafy spurge	_____	_____
d. prickly pear	_____	_____
e. sagebrush	_____	_____
f. thistles	_____	_____
g. wormwood	_____	_____
h. field bindweed	_____	_____
i. others (please specify)	_____	_____

7. Do you currently have any leafy spurge on your farm or ranch?

_____ Yes

_____ **No** (if **No**, go to Question 9)

8. Are you *currently using* any of the following general practices to control leafy spurge:
 (Please circle the appropriate response)

a. herbicides

Yes	No			
		If no, do you plan to use herbicides in the future	Yes	No
		If yes, do you plan to continue to use herbicides	Yes	No

b. biological control with insects (such as flea beetles)

Yes	No			
		If no, do you plan to use biological control with insects in the future	Yes	No
		If yes, do you plan to continue to use biological control with insects	Yes	No

c. sheep or goat grazing

Yes	No			
		If no, do you plan to graze sheep or goats in the future	Yes	No
		If yes, do you plan to continue to graze sheep or goats	Yes	No

d. tillage and/or reseeding with competing grasses

Yes	No			
		If no, do you plan to till or reseed in the future	Yes	No
		If yes, do you plan to continue tilling and reseeding	Yes	No

e. Integrated Pest Management (IPM) approach utilizing at least two control methods listed above

Yes	No			
		If no, do you plan to use IPM practices in the future	Yes	No
		If yes, do you plan to continue to use IPM practices	Yes	No

9. Even if you have no leafy spurge on your farm or ranch, how would you rate the **effectiveness** of the following practices in controlling leafy spurge?

	Not Effective	Somewhat Effective	Very Effective	Don't Know
a. spraying with herbicides	1	2	3	4
b. biological control with insects	1	2	3	4
c. control with grazing animals such as sheep or goats	1	2	3	4
d. tillage and/or reseeding with competing grasses	1	2	3	4
e. Integrated Pest Management (IPM) using two or more control methods	1	2	3	4
f. other controls (please specify _____)	1	2	3	4

10. Even if you have no leafy spurge on your farm or ranch, do you think it **pays** to use the following leafy spurge control practices?

	Yes, It Pays	Pays Marginally	Does Not Pay	Don't Know
a. spray with herbicides	1	2	3	4
b. biological control with insects	1	2	3	4
c. graze animals such as sheep or goats	1	2	3	4
d. till and/or reseed with competing grasses	1	2	3	4
e. Integrated Pest Management (two or more controls)	1	2	3	4
f. other controls (please specify _____)	1	2	3	4

11. What type of weed management information would you like to obtain?

	Not Interested	Somewhat Interested	Very Interested
a. techniques and effectiveness of various herbicide treatment programs	1	2	3
b. economics of herbicide treatments	1	2	3
c. how to get started with biological control using insects	1	2	3
d. economics of biological control with insects	1	2	3
e. techniques and effectiveness of sheep and goat grazing	1	2	3
f. economics of sheep and goat grazing	1	2	3
g. techniques and effectiveness of cultivation and reseeding	1	2	3
h. economics of cultivation and reseeding	1	2	3
i. techniques and effectiveness of Integrated Pest Management programs	1	2	3
j. economics of Integrated Pest Management programs	1	2	3
k. others (please specify _____)	1	2	3

12. In what form would you like to receive weed control information?

	Not Interested	Somewhat Interested	Very Interested
a. pamphlet or bulletin available through an Extension office or county agent	1	2	3
b. video cassettes demonstrating the various control methods	1	2	3
c. area demonstration plots showing the effectiveness of various control methods	1	2	3
d. testimonials from fellow ranchers or other land managers	1	2	3
e. computer decision aids (programs) that can be used to evaluate the feasibility or economics of various controls	1	2	3
f. personal visits and on-site help by range management specialists	1	2	3
g. website/internet	1	2	3
h. email newsletters or notifications	1	2	3
i. others (please specify _____)	1	2	3

The following questions pertain to The Ecological Areawide Management (TEAM) Leafy Spurge Integrated Pest Management Program. TEAM Leafy Spurge is a USDA-Agricultural Research Service Program focused on leafy spurge in the Little Missouri River drainage of Wyoming, Montana and the Dakotas. Its goal is to research, develop and demonstrate ecologically based Integrated Pest Management strategies that can be used to achieve effective, affordable and sustainable leafy spurge control.

13. Are you aware of The Ecological Areawide Management (TEAM) Leafy Spurge Project?

Yes No (If No, skip to question #15)

If yes, when did you first hear about the project?

1997 _____
 1998 _____
 1999 _____
 2000 _____
 2001 _____

14. How did you first hear about the project? (mark only one)

another rancher or neighbor _____	county agent _____
newspaper _____	university press release _____
Internet _____	county weed board meeting _____
State Weed Control _____	state or federal land manager _____
Association conference _____	other _____

15. Have you attended any of the following TEAM Leafy Spurge events in the last four years?

If yes, please rate how informative/helpful this activity was for your weed control efforts.

	Attended								
	Yes	No	Excellent						
◆ 1999 Spurgefest in Medora	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
◆ 2001 Spurgefest in Medora	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
◆ TEAM Leafy Spurge presentation at another event or meeting	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

If you attended a spurgefest meeting, do you have any suggestions or ideas that would improve Spurgefest?

16. Have you visited either of the North Dakota demonstration sites near Sentinel Butte and/or Medora? *If yes, please rate how informative/helpful this activity was for your weed control efforts.*

	Yes	No	Excellent					Poor	
biological control (insects)	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
sheep grazing	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
herbicide treatment	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

17. Have you visited the Montana demonstration site near Ekalaka? *If yes, please rate how informative/helpful this activity was for your weed control efforts.*

	Yes	No	Excellent					Poor	
biological control (insects)	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
herbicide treatment	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

18. Have you visited the South Dakota demonstration site near Buffalo? *If yes, please rate how informative/helpful this activity was for your weed control efforts.*

	Yes	No	Excellent					Poor	
biological control (insects)	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
sheep grazing	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1
herbicide treatment	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

19. Have you received any TEAM Leafy Spurge brochures, handouts or bulletins? *If yes, please rate how informative/helpful this information was for your weed control efforts.*

	Yes	No	Excellent					Poor	
	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

20. Have you visited the TEAM Leafy Spurge website at www.team.ars.usda.gov? *If yes, please rate how informative/helpful this website was for your weed control efforts.*

	Yes	No	Excellent					Poor	
	<input type="checkbox"/>	<input type="checkbox"/>	7	6	5	4	3	2	1

21. Have you heard of the Purge Spurge CD?

Yes No (if No, please go to question # 23)

22. Have you used the Purge Spurge CD? Yes No

If yes, please rate how informative/helpful this activity was for your weed control efforts.

Excellent					Poor		
7	6	5	4	3	2	1	

23. Did you collect or receive insects at any TEAM Leafy Spurge sponsored event?

Yes No

If yes, when did you receive and distribute the insects? Please check all that apply.

1999 _____
 2000 _____
 2001 _____

24. Have the insects had any effect on the leafy spurge? Yes No

If yes, to what degree have the insects established at the release site(s).

Have definitely established					Have not established		
7	6	5	4	3	2	1	

If yes, please rate the level of control to date.

Excellent					Poor		
7	6	5	4	3	2	1	

The following questions are designed to assess the impact of the TEAM Leafy Spurge project on your weed control strategies.

Herbicides

25. Has TEAM Leafy Spurge satisfactorily demonstrated the effectiveness of using herbicides to control leafy spurge?

Yes No

26. Has TEAM Leafy Spurge satisfactorily provided you with information on how to properly use herbicides to control leafy spurge?

Yes No

27. Has TEAM Leafy Spurge influenced your plans to use herbicides on leafy spurge in the future?

Yes

No

If no, what best describes your situation (check all that apply)

- I am currently using herbicides
- infestation is too large, herbicides would be prohibitively expensive
- infestations are inaccessible to sprayers
- lack equipment, expertise or access to certified applicators
- I am not convinced herbicides are effective
- I cannot afford to purchase herbicides
- I do not have time to spray
- environmental restrictions (spraying near water, trees, sensitive crops) prevent herbicide use
- potential damage to non-target species
- it is not economical to use herbicides
- cost share programs are no longer available or have been reduced
- I am currently using other control methods
- other _____

If yes, what best describes your situation (check all that apply)

- I plan to spray more of my leafy spurge as a result of TEAM Leafy Spurge
- I plan to use herbicides to stop my infestations from spreading
- I plan to switch herbicides
- I plan to change herbicide application rates
- I plan to change on which infestations I use herbicides
- I plan to reduce herbicide use and switch to other controls
- I plan to integrate herbicides with other control agents such as flea beetles and /or sheep grazing
- other _____

Biological Control with Insects

28. Has TEAM Leafy Spurge satisfactorily demonstrated the effectiveness of using biological agents such as flea beetles to control leafy spurge?

Yes No

29. Has TEAM Leafy Spurge satisfactorily provided you with information on how to properly use biological agents such as flea beetles to control leafy spurge?

Yes No

30. Has TEAM Leafy Spurge influenced your plans to use biological control agents such as flea beetles on leafy spurge in the future?

Yes

No

if no, what best describes your situation (check all that apply)

infestation is too small to use biological control (insects)

still not convinced biological control with insects will work

I do not know how to use biological control with insects

I do not know where to collect insects

I do not have time to collect or release biological agents

limited access to biological agents/can not collect sufficient numbers of agents

infestations are not suitable for biological control

insects have not been effective on my infestations in the past

biological control agents (insects) are not economical to use

I am currently using other control methods

I was already using insects; TEAM Leafy Spurge hasn't changed anything

biological control with insects works too slowly

biological agents will eventually spread to my land without my help

I am afraid the agents will harm other plants

other (_____)

if Yes, what best describes your situation (check all that apply)

I am currently using or planning to use biological control with insects on my leafy spurge as a result of TEAM Leafy Spurge

I am going to modify where I use insects

I am going to change how I collect and release insects

because insects are free and readily available, I am now trying biological control methods

other (_____)

Sheep Grazing

31. Has TEAM Leafy Spurge satisfactorily demonstrated the effectiveness of grazing sheep to control leafy spurge?

Yes

No

32. Has TEAM Leafy Spurge satisfactorily provided you with information on how to properly implement a sheep grazing program to control leafy spurge?

Yes

No

33. Has TEAM Leafy Spurge influenced your plans to graze sheep on leafy spurge in the future?

Yes

No

if no, what best describes your situation (check all that apply)

- my pasture acreage is too small to graze sheep
- my infestation is too small to graze sheep
- I am still not convinced sheep grazing will work
- I do not know enough about sheep management to implement a program
- do not have the resources to manage sheep or goats
- sheep grazing will negatively affect non-target species
- sheep grazing programs have been ineffective on my infestations in the past
- sheep grazing to control leafy spurge is too costly, not economical to use
- sheep will compete with cattle for forage
- there are too many constraints to starting a sheep grazing program-- fencing, stock, equipment, etc.
- I do not like sheep or goats
- sheep or goat grazing is too time consuming
- I do not want another enterprise on the ranch
- other _____

if Yes, what best describes your situation (check all that apply)

- I am using or planning to use sheep grazing on my leafy spurge as a result of TEAM Leafy Spurge
- I am convinced grazing works, but do not have the resources to implement and manage a grazing program
- I am currently using sheep as a control method
- other _____

Issues and Attitudes Toward the TEAM Leafy Spurge Project.

34. Please rate each of the following statements describing the TEAM Leafy Spurge Integrated Pest Management program.

	Strongly Disagree	Somewhat Disagree	Neither Dis/Agr	Somewhat Agree	Strongly Agree
The project has been effective in demonstrating and communicating leafy spurge treatment and control options to ranchers	1	2	3	4	5
The project has clearly demonstrated the effectiveness of herbicides in controlling leafy spurge	1	2	3	4	5
The project has clearly demonstrated the effectiveness of biological control agents such as flea beetles in controlling leafy spurge	1	2	3	4	5
The project has clearly demonstrated the effectiveness of sheep grazing in controlling leafy spurge	1	2	3	4	5
I have personally benefitted from the project	1	2	3	4	5
Project funding should be extended to continue research and education programs	1	2	3	4	5

35. Would the TEAM Leafy Spurge format be applicable for new programs that would focus on other problem rangeland weeds?

<u>Targeted weed</u>	<u>Helpful</u>	
Knapweed(s)	Yes	No
Canada thistle	Yes	No
Other _____	Yes	No

36. What changes would you like to see if another project like TEAM Leafy Spurge was developed for other problem rangeland weeds? (please check all that apply)

- _____ more demonstration sites
- _____ better interaction with and accessibility to the researchers
- _____ more outreach activities like field days and workshops
- _____ more frequent field tours of demonstration sites
- _____ more opportunities to collect insects
- _____ other sources of insects in addition to self-collection
- _____ a monthly bulletin, newsletter or e-mail notifications
- _____ other



We would now like to ask a few general questions about the characteristics of your farm/ranch. These responses will help us to compare ranch characteristics. Also included in this section are financial questions about your farming/ranching activities in 2000. If you are in a partnership or corporation, please answer for the entity and **not** just for your share. **PLEASE BE ASSURED THAT RESPONSES WILL BE AVERAGED OVER SEVERAL COUNTIES AND YOUR INDIVIDUAL RESPONSES WILL BE KEPT STRICTLY CONFIDENTIAL.** These responses help compare attitudes and perceptions based on respondent characteristics.

37. In 2000 how many acres did you:

	Hay Land/ Cropland	Grazing Land	Total
a. Own	_____	_____	_____
b. Rent or lease from others	_____	_____	_____
c. Rent or lease to others	_____	_____	_____

38. How many head of livestock did you graze in 2000?

	Estimated Number of Head
Cattle and calves	_____
Sheep and lambs	_____
Horses	_____
Others (specify _____)	_____

39. Did you use any public (federal and/or state) land for grazing in 2000? Yes / No

If **Yes**, how many acres _____ or number of permitted AUMS _____ ?

40. Do you use a computer to assist you in the operation of your farm or ranch? Yes / No

If **yes**, do you have access to the Internet? Yes / No

41. Which of the following categories best describes your **gross farm income** (exclude hunting and oil/gas lease income) in 2000?

- | | |
|---------------------------|---------------------------|
| a. \$50,000 or less | e. \$200,001 to \$250,000 |
| b. \$50,001 to \$100,000 | f. \$250,001 to \$300,000 |
| c. \$100,001 to \$150,000 | g. \$300,001 to \$350,000 |
| d. \$150,001 to \$200,000 | h. Over \$350,000 |

42. Which of the following categories best describes your **net farm income** (gross cash farm income less gross cash farm expenses) in 2000?

- | | |
|-------------------------|-------------------------|
| a. negative | e. \$20,001 to \$30,000 |
| b. \$0 to \$5,000 | f. \$30,001 to \$40,000 |
| c. \$5,001 to \$10,000 | g. \$40,001 to \$50,000 |
| d. \$10,001 to \$20,000 | h. Over \$50,000 |

43. Approximately what percentage of your gross farm income in 2000 came from grazing livestock?

_____ percent

44. In what county and state do you live? _____ County _____ State

Please feel free to offer any additional thoughts or comments you may have regarding weed management and/or TEAM Leafy Spurge. This is your opportunity to address any issues not covered in this questionnaire. **Your response is important and will be kept strictly confidential.**

Thank you for completing this questionnaire, your cooperation is sincerely appreciated.

Please return this questionnaire in the enclosed prepaid envelope.

For a copy of the study results, please provide your name and mailing address below or you may contact the Department of Agribusiness and Applied Economics at North Dakota State University in Fargo, ND. Phone 701-231-7357, Fax 701-231-7400 or E-mail: nhodur@ndsuxext.nodak.edu or visit our departmental listing of research reports on the world wide web at <http://agecon.lib.umn.edu/>

We anticipate a final report will be available to the public in the first half of 2002.